

NEW AND LITTLE-KNOWN SPECIES OF SOUTH AMERICAN  
FRESH-WATER MUSSELS OF THE GENUS DIPLODON.

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The new *Diplodon* herein described under the name *felipponei* was received in 1915 from Dr. Florentino Felippone, of Montevideo, Uruguay. The one described under the name *fortis* was received from the same donor about three years ago and has been in the collection of the United States National Museum under the name of *D. delodontus*.

Illustrations are given of six other species of *Diplodon* described by Mr. C. T. Simpson from material in the collection of the United States National Museum. Hitherto these species have not been figured.

DIPLODON FELIPPONEI, new species.

Plate 50, figs. 1-3; plate 51, fig. 1.

Shell thick, heavy and moderately swollen, elliptic in outline, valves greatly thickened in front. Gaping slightly front and back. Surface nearly evenly rounded and lacking a clearly defined posterior ridge. Anterior and posterior portions rounding up gently into the middle portion of the shell. Middle of the posterior area with a low, rounded, radial rib, other parts of shell obscurely radiately striated. On the middle portion the striae become more pronounced and partake of the nature of obsolete ribs. Rest periods about seven, indicated by a concentric elevating of the surface above the succeeding growth. Color light yellowish chestnut at the beaks, deepening regularly toward the margins, where it becomes dark chestnut. Periostracum shining, paper-like, tending to peel and curl at the posterior margin. Nacre silvery white, slightly iridescent at the posterior end, obsoletely thimble-pitted or granular. Anterior adductor scar deep, especially at its upper part, posterior adductor scar nearly superficial. Other muscle scars deeply punched. Pseudocardinal teeth large and heavy and much split up. Right valve with a large lateral tooth which is granular on both its surfaces. Left valve with two lateral teeth which are granular on their inner faces. Sinulus long, narrow, slightly bowed and ending in a sharp point.

The type, Cat. No. 322291, U.S.N.M., comes from Maldonado, Uruguay. It measures—length, 83 mm.; height, 59 mm.; diameter, 38 mm. It was donated to the United States National Museum by Dr. F. Felippone, of Montevideo, Uruguay, in whose honor I take pleasure in naming the species.

In richness and warmth of coloring, regularity of form and outline and in its appearance of exuberant health and prosperity this is one of the handsomest of the *Diplodons*. Externally it mimics some of the forms of *Anodontites wymani* and might pass for that shell if mixed in with a series of that species.

Its relationships point in two directions—namely, toward *D. rudus* Lea and *D. paranensis* Lea. Both of these species show the obsolete radiating ribs noted in the description of *felipponei*. From *D. rudus* it differs in outline, in not having a compressed posterior area and in being nearly straight instead of sinuate along the hinge line, and especially in the character of the pseudocardinals which, in *D. rudus*, are long and thin and placed parallel to the hinge line. From *D. paranensis* it can be distinguished at once by the elliptic outline, lack of the inflated ventral margin and by the character of pseudocardinals.

Another specimen of this same species is Cat. No. 180782, which measures—length, 77 mm.; height, 54 mm.; diameter, 31 mm. It comes from Arroyo Sarandi Grande, Uruguay, and was received from Mr. S. Olea. It is an exact duplicate of the type in every detail except size and state of preservation. The ratios of its length to height and to diameter are almost exactly the same as those of the type. This specimen has been in the collection since 1904 without specific name.

Since the above was written I have identified for Doctor Felippone five specimens of this species. One of these (his No. 593) from Arroyo Maciel, Florida, Uruguay, is, in some respects, superior to the type, especially in size. It measures—length, 94 mm.; height, 68 mm.; diameter, 40 mm. His numbers 606, 609, 610, and 611 each include a single valve in a poor state of preservation. They come from Rio Yi, Durazno, Uruguay.

*DIPLODON FORTIS*, new species.

Plate 52, figs. 1-4.

Shell thick, heavy, and much swollen. Outline elongately subquadrate, regularly rounded in front, prolonged into a blunt point behind, resembling in general form many specimens of *Unio tetralasmus* Say. Posterior dorsal ridge full, high, and rounded. A faint rib traverses the posterior area from the beak to a point just above the posterior angle. Ventral and dorsal margins nearly parallel. Surface with indistinct concentric fine lines, the rest periods indicated by dark lines. Anterior and middle portion with obscure radial sculpture. Color chestnut brown, darker posteriorly. Beaks eroded.

Nacre silvery white, tending to bluish white and iridescence posteriorly. Right valve with one small and one large pseudocardinal tooth, the latter grooved lengthwise; and a winglike lateral tooth. Left valve with a large anterior pseudocardinal, a deeply sunken linear mid-tooth, and a small posterior tooth. Lateral teeth of left valve two, very strong. Anterior muscle scars deeply impressed, posterior scars superficial. Anterior portion of shell much thickened, especially between the pallial line and the ventral margin. Shell gaping slightly front and back, enough to insert a slip of thick paper. Sinulus long, narrow, and pointed.

The type, Cat. No. 270899, U.S.N.M., measures—length, 66 mm.; height, 37 mm.; diameter, 27 mm. It comes from Rio Negro, Tacuarembó, Uruguay. It was presented to the museum several years ago by Dr. Florentino Felippone, and has been here under the name *delodontus* Lamarck. This species is related to *Diplodon charruanus* Orbigny, but is more nasute, having the ventral margin nearly straight and more nearly parallel to the dorsal margin. The pseudocardinal teeth of *charruanus* are largely divided into sharp points with corresponding sockets in the opposing teeth. Compared with these the teeth of *fortis* are much more simple. Authentic specimens of *charruanus*, from Orbigny show that its beaks are heavily sculptured and that this sculpture covers a considerable area. The beaks of *fortis* are eroded but the area eroded is less than the area sculptured in *charruanus*, and yet there is no indication of sculpture. From this it may be inferred that the sculptured area in *fortis* would be less than that in *charruanus*. Although of but moderate size, its compact, chunky form, its weight, and the thickening of the shelly matter, conveys an idea of strength and this has suggested the specific name *fortis*.

#### THE TYPES OF SIX LITTLE-KNOWN SPECIES OF SOUTH AMERICAN *DIPLODON*.

The following six species were described by Mr. Charles T. Simpson in A Descriptive Catalogue of the Naiades, or Pearly Fresh-water Mussels, published in 1914. His descriptions were based upon material in the collection of the United States National Museum, but no figures were given. The following descriptions and illustrations of the types will help more clearly to define the various species:

##### *DIPLODON MIMUS* Simpson.

Plate 51, figs. 3-6.

*Diplodon mimus* SIMPSON, A Descriptive Catalogue of the Naiades or Pearly Fresh-water Mussels, 1914, p. 1249.

Shell small, solid, obliquely rhomboid, somewhat inflated along the posterior ridge, which is low, rounded, and widely biangulate.

Dorsal and ventral margins nearly parallel. Growth lines numerous, fine. Rest periods not sharply defined. Periostracum thin, closely adhering, slightly ruffled along the ventral margin, light chestnut in color, somewhat tawney in the center of the disk. Beaks much eroded. Pseudocardinals two in the right valve, the upper very small, the lower thick, high, and much crenulated. Pseudocardinals of left valve two, widely separated, the rear one small, the front one larger and much crenulated. Lateral tooth of right valve high, granulous. Lateral teeth of left valve subequal, crenulated. Nacre lurid, purplish-white, thickened in front.

The type (pl. 51, figs. 3-6) is one of two specimens of United States National Museum, Cat. No. 162425. It measures—length, 45 mm.; height, 27 mm.; diameter, 15 mm.; and comes from Iguape, Brazil, from Dr. H. von Ihering.

"A small, solid, rhomboid species which almost exactly mimics in external appearance some of the varieties of *Unio complanatus*."—Simpson.

DIPLODON PERPLEXUS Simpson.

Plate 52, fig. 5; plate 53, figs. 1-4.

*Diplodon perplexus* SIMPSON, A Descriptive Catalogue of the Naiades or Pearly Fresh-water Mussels, 1914, p. 1248.

Shell moderately thin, subrhomboidal, regularly rounded in front, obtusely pointed behind; posterior margin oblique. Ventral and dorsal margins subparallel. Posterior ridge low, rounded. Beaks but little elevated, located one-quarter of the length of the shell from the anterior margin. Surface of the shell with many fine growth lines. Rest periods feebly marked, except the last which is indicated by a dark line and a shallow groove. Periostracum thin, shining, closely adhering, olivaceous, darkening to chestnut anteriorly and posteriorly, slightly ruffled on the posterior dorsal area. Anterior half of shell with numerous, well-marked radiating striae. Nacre milky white and thickened anteriorly, moderately iridescent and thin posteriorly. Pseudocardinals of right valve unequal, the upper one small, the lower one three times as high, crenulated, set at an angle of about fifty degrees with the lateral. Pseudocardinal of right valve obliquely flattened and somewhat excavated, its upper margin sharply crenulated. Lateral tooth of right valve thin, high, slightly arcuate, its margin crenulated. Laterals of left valve two, the upper one low, the lower one high, the groove between them deep and narrow.

The type (pl. 53, figs. 1-4) is one of four specimens in the United States National Museum (Cat. No. 150389), and measures—length, 77 m.; height, 43 mm.; diameter, 26 mm. It comes from Lake Portrero, near Maldonado, Uruguay, and was collected and presented by Dr. William Rush, U. S. N. Four other specimens and

one odd valve (Cat. No. 150390 U.S.N.M.) were sent by Doctor Rush from the same place.

A lot of South American naiades just identified for Doctor Felippone includes 27 specimens of this species, of various ages, from localities in Uruguay. The two largest and oldest specimens measure, respectively—length, 91 mm.; height, 47 mm.; diameter, 27 mm.; and length, 86 mm.; height, 46 mm.; diameter, 29 mm. The old specimens retain all the typical characters, and vary from the younger specimens only in the thickening and enlarging of the pseudocardinal teeth. As is well known, a similar thickening and enlarging of these teeth is a common, almost a usual, occurrence in old specimens of the naiades in general.

*DIPLODON SUPPOSITUS* Simpson.

Plate 51, fig. 2; plate 54, figs. 1-4.

*Diplodon suppositus* SIMPSON, A Descriptive Catalogue of the Naiades or Pearly Fresh-water Mussels, 1914, p. 1245.

*Diplodon piceus* (part) SIMPSON, Synopsis, 1900, p. 877.

Shell moderately thin to subsolid, thinner posteriorly, slightly thickened anteriorly. Outline subrhomboidal, regularly rounded in front, bluntly round-pointed behind. Dorsal and ventral margins nearly parallel, the ventral margin slightly arcuate. Posterior dorsal ridge nearly wanting and, hence, the posterior dorsal area not distinctly marked off from the general surface of the shell. Beaks low, eroded in the type. Surface of shell with many poorly marked growth lines, obscurely showing four rest periods. Anterior portion with faint radial striae. Epidermis chestnut, bronzy. Nacre bluish white or livid, nearly dull anteriorly, brilliant posteriorly. Radiating striae show through the nacre at the posterior third. Pseudocardinals of right valve two, thin, parallel, set at an angle of about sixty degrees with the lateral. In the left valve the pseudocardinals are not sharply defined into two. Lateral teeth two in the left valve, one in the right valve.

The type (pl. 54, figs. 1-4) measures—length, 49 mm.; height, 26 mm.; diameter, 14 mm. It came from Parana, Brazil, and is one of four specimens bearing Cat. No. 162374, U.S.N.M.

Plate 51, fig. 2, represents the beak of this species, enlarged three diameters. The specimen figured comes from Rio Tiete, Brazil, and is one of three specimens in the United States National Museum (Cat. No. 128824). Both the specimens figured were received from Dr. H. von Ihering.

In addition to the specimens mentioned above the collection contains twelve other lots including 26 specimens, all from localities in Southern Brazil. All these were identified by Simpson as belonging to *D. suppositus*.

## DIPLODON TRIVIALIS Simpson.

Plate 54, figs. 5-8.

*Diplodon trivialis* SIMPSON, A Descriptive Catalogue of the Naiades or Pearly Fresh-water Mussels, 1914, p. 1250.

Shell obovate, moderately inflated, subsolid, evenly rounded before and behind, narrower in front. Dorsal and ventral margins curving. Posterior ridge rounded, scarcely developed. Beaks moderately elevated, somewhat eroded, but showing that the sculpture consisted of about 20 radiating bars. Surface with a number of feebly marked growth lines, with four rest periods, indicated by dark lines. Faint indications of radiating striae on nearly the whole surface. Periostracum scarcely shining, clothlike, very dark olivaceous chestnut, closely adhering. Nacre bluish-white, somewhat iridescent, thickened along part of the ventral margin. Pseudocardinals of right valve parallel to each other, the upper one low, small and linear. The lower one thick, triangular, set at an angle of about 50 degrees with the lateral. Pseudocardinals of left valve distinctly two, subequal, set at an angle with each other. Lateral of right valve thin and high. Laterals of left valve subequal, the groove between them rather deep and wide.

The type (pl. 54, figs. 5-8), Cat. No. 162409, U.S.N.M., measures—length, 51 mm.; height, 33 mm.; diameter, 19 mm. It comes from Taboticabal, São Paulo, Brazil, and was received from Dr. H. von Ihering. Cat. No. 162406 includes two specimens and Cat. No. 162411 includes one specimen, all from the same source as the type. Cat. Nos. 125739, 162407, and 162408 each include one specimen from Piracicaba, São Paulo, Brazil, from Dr. von Ihering. Cat. No. 125703 includes one specimen from Rio Grande do Sul, São Paulo, Brazil, from Mr. B. H. Wright.

Mr. Simpson at first identified all of the above as *Diplodon peculiaris* Lea, but later came to the conclusion that they belonged to a new species. The collection contains the type of *peculiaris*, with which I have compared the type of *trivialis*, and I believe the two are distinct. Figure 6 shows the sculpture of the beaks. The rays are finer, more numerous, occupy a smaller area, and are more nearly parallel than those of *peculiaris*.

Two of the eight specimens in the collection have two lateral teeth in each valve. The other six specimens have a single lateral in the right valve and two laterals in the left valve.

## DIPLODON SANTA MARIAE Simpson.

Plate 52, fig. 6; plate 55, figs. 1-4.

*Diplodon santa mariae* SIMPSON, A Descriptive Catalogue of the Naiades or Pearly Fresh-water Mussels, 1914, p. 1270.

Shell oblong, rhomboid, nearly twice as long as wide, moderately thin. Ventral and dorsal margins nearly parallel. Posterior ridge low, rounded, biangulate. Posterior margin biangulate. Beaks low,

much eroded. Surface with many fine lines of growth and with four rest periods indicated by dark lines. Numerous well-marked striae radiate from the beaks to the ventral margin. Periostracum dark brown, somewhat bronzy, scarcely shining, darker at the posterior end. Nacre livid in the upper portion, white below, brilliant posteriorly, thickened anteriorly, iridescently radiately striate. Pseudocardinals of right valve long, low, the upper the smaller, the groove between them slightly curved. Pseudocardinal of the left valve plate like, standing on a narrow shelf, thin at its upper end, thickened at the lower end. Lateral tooth of right valve long, low, and granulous. Laterals of the left valve nearly equal, the groove between them widening at the rear.

The type (pl. 55, figs. 1-4) is one of three specimens of Cat. No. 162383, U.S.N.M., from Rio Itapoca, Brazil, received from Dr. H. von Ihering. It measures—length, 63 mm., height, 33 mm., diameter 18 mm. Plate 52, figure 6, shows the beak (enlarged three diameters) of a specimen from the same locality and with the same catalogue number.

**DIPLODON SEMIGRANOSUS** Simpson.

Plate 55, figs. 5-8.

*Diplodon semigranosus* SIMPSON, A Descriptive Catalogue of the Naiades or Pearly Fresh-water Mussels, 1914, p. 1252.

Shell rather small, irregularly long elliptical, sharply rounded in front, somewhat nasute behind. Ventral margin regularly curved. Posterior ridge rounded, scarcely developed. Beaks apparently low, eroded, retaining vestiges of radial, somewhat granular, sculpture. Surface with feeble growth lines and three or four rest periods indicated by dark lines. Numerous faint, slightly granular striae radiate from the beaks, giving the surface a semigranulous appearance, especially anteriorly.

Periostracum thin, closely adhering, olivaceous, tinged with greenish, somewhat glossy. Nacre dirty bluish-white, thickened along the forward portion of the ventral margin, thin and iridescent posteriorly. Pseudocardinals of right valve moderately thick, parallel, the groove between them wide and deep. Pseudocardinal of left valve thin and plate-like. Lateral tooth of right valve moderately high. The upper lateral of the left valve low and weak, the lower one higher and moderately strong.

The type (pl. 55, figs. 5-8) is one of 11 specimens of Cat. No. 128790, U.S.N.M., from Rio Tiete, São Paulo, Brazil, from Dr. H. von Ihering. It measures—length, 47 mm.; height, 26 mm.; diameter, 15 mm.

Cat. No. 162414 includes two and No. 162415 one specimen from Ponte Grande, São Paulo, No. 162413 one specimen from Os Perus, São Paulo; No. 162412 six specimens from Ponta Grossa, Parana. All these localities are in southern Brazil and all the specimens were received from Dr. von Ihering.

## EXPLANATION OF PLATES.

## PLATE 50.

FIGS. 1-3. *Diplodon felipponei* Marshall. Natural size.

## PLATE 51.

FIG. 1. *Diplodon felipponei* Marshall. Natural size.

2. *Diplodon suppositus* Simpson. Beak  $\times$  3.

3-6. *Diplodon mimus* Simpson. Natural size.

## PLATE 52.

FIGS. 1-4. *Diplodon fortis* Marshall. Natural size.

5. *Diplodon perplexus* Simpson. Beak  $\times$  3.

6. *Diplodon santa mariae* Simpson. Beak  $\times$  3.

## PLATE 53.

FIGS. 1-4. *Diplodon perplexus* Simpson. Natural size.

## PLATE 54.

FIGS. 1-4. *Diplodon suppositus* Simpson. Natural size.

5-8. *Diplodon trivialis* Simpson. Natural size.

## PLATE 55.

FIGS. 1-4. *Diplodon santa mariae* Simpson. Natural size.

5-8. *Diplodon semigranosus* Simpson. Natural size.